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RESEARCH REPORT

THE FUTURE OF THE JOINT AIR ATTACK TEAM IN THE AIR-LAND BATTLE

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THE FUTURE OF THE JOINT AIR ATTACK TEAM IN THE AIR-LAND BATTLE

by

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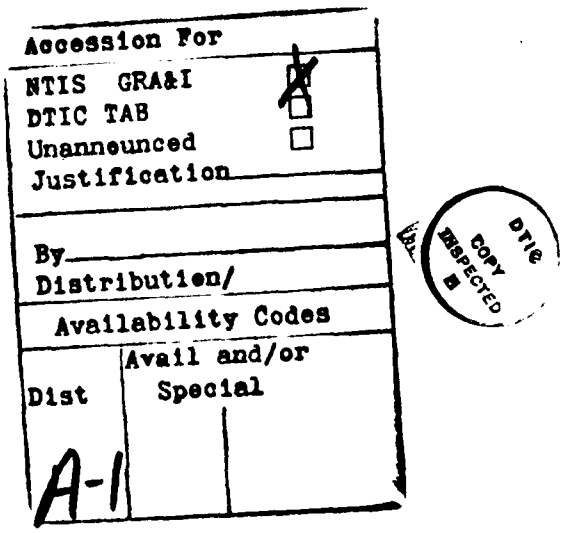

EXECUTIVE SUMMARY

TITLE: The Future of the Joint Air Attack Team In the Air-Land Battle

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The Joint Air Attack Team (JAAT) can be a combat multiplier against a highly motorized and modernized enemy on the battlefield of the 1990s. Procedures for conduct of the JAAT have been standardized and disseminated for implementation among all of the United States Armed Forces. The doctrinal publication is now in the field as a working draft. The threat facing the JAAT on the modernized battlefield of the 1990s will cause some current procedures and equipment to be outmoded. The JAAT is described from its inception to the JAAT concept in use today. Technological improvements in the JAAT's systems and in the threat's capability are used as a means to show the changes and transitions needed to the future JAAT concept. The study illuminated seven findings which are also presented.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Lauren G. Mullendore has been interested in the combined services integration of tactical rotary-wing and fixed-wing aircraft since he learned and employed the concept in the Republic of Vietnam in 1969. He has orchestrated numerous air mobile exercises and air assaults, as well as joint air attack teams in war and in peacetime exercises using United States Air Force, Marine Corps, Navy, and Army aircraft. He has served in aviation assignments in Vietnam, Korea, the Federal Republic of Germany, and the United States. His most recent aviation assignment was as an aviation battalion commander in the 101st Airborne Division (Air Assault) from 1986 to 1988. He is a 1980 graduate of the United States Army Command and General Staff College and a 1989 graduate of the Air War College. His civilian education includes a Master of Science in Education from the University of Southern California and a Master of Arts in Personnel Management from Central Michigan University.

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CHAPTER 1

INTRODUCTION

The current procedures for the conduct of the Joint Air Attack Team (JAAT) are outmoded and need to be changed to accommodate the threat expected on the battlefields of the 1990s. The modernized threat, offensive tactics, and lethal weaponry that will be employed by the Warsaw Pact will require changes in the JAAT procedures, equipment and components to remain survivable and to accomplish the mission.

Joint service doctrine defines the JAAT as follows: "The Joint Air Attack Team (JAAT) involves a combination of attack helicopters and tactical/fixed-wing aircraft, normally supported by artillery or naval gunfire, operating together simultaneously to attack surface targets." (1:1-1) Therefore, the complete JAAT requires three primary components operating together in attacking a single target array: attack helicopters, fixed-wing/fighter aircraft, and artillery (either naval gunfire or tube artillery). (1:1-1) JAAT is the ideal example of synchronization in multi-service military operations and must be understood by joint force commanders. For the JAAT to remain viable as an effective method for improving combined arms operations, JAAT must keep pace with equipment modernization, modifications to tactical techniques, and technological advancements.

This paper will assess the future of the JAAT in the Air-Land battle by tracing the background and development of the JAAT from its origin to the JAAT concept in use today and by showing the need for changes in the JAAT concept. The technological advances in weapons and systems used in JAAT will be shown to provide a backdrop for the future evolution of the JAAT concept which must change to accommodate the 1990s battlefield. Finally, the paper will provide conclusions and findings based on an analysis of JAAT employment in the future battle.

CHAPTER II

BACKGROUND OF THE JOINT AIR ATTACK TEAM

The Joint Air Attack Team (JAAT) was born in an exercise at Fort Benning, Georgia, in September 1977, as a viable and synchronized method to kill a highly motorized enemy. The Fort Benning exercise was known as the Joint Attack Weapons System test. (2:4) It tested the capability of the United States Air Force (USAF) A-10 Thunderbolt aircraft and the Army AH-1 Cobra attack helicopter to synchronize tactics and fires to kill targets on the battlefield. (2:5) The test was necessary to synchronize teams of Army attack helicopters and close air support (CAS) USAF aircraft who "were operating in the same battlefield airspace and attacking the same target arrays." (3:15) The September exercise led to two follow-on joint exercises known as Joint Attack Weapons System II at Fort Benning in 1978 and the Tactical Aircraft Survivability Evaluation at Fort Hunter-Liggett, California, in 1979. (2:5) This series of exercises led to the first joint publication on air attack by Tactical Air Command (TAC) and Training and Doctrine Command (TRADOC) on joint air attack. (4:70) These exercises, employing the A-10 and the AH-1 in joint CAS operations, secured a marriage of armor killers that has lasted to the present.

The Joint Attack Weapons Systems I and II and the Tactical Aircraft Survivability Evaluation exercises

revealed that the joint employment of the A-10 and AH-1 produced increased survivability and enhanced armor-killing capability for each aircraft. Specific results obtained from these exercises were significant:

- The vulnerability to hostile fire and attrition of the A-10 and the AH-1 decreased significantly when they were jointly deployed. (5:16)

- Kill ratios for armored targets increased fourfold when jointly deployed as opposed to separately deployed. (5:16)

- The A-10s should attack singly and not in pairs to enhance survivability. (2:53)

- The best kills on armored targets occurred from rear and flank shots. (2:53)

- AH-1 aircraft provided "visual cues" for A-10s to locate their targets. (2:54)

- Forward Air Controllers (FACs) were more survivable and could more clearly observe the battle when in a scout helicopter. (2:54)

The marriage of the A-10 and the AH-1 in the battlefield anti-armor role produces a capability that provides a significant combat multiplier for the combined arms commander. However, the A-10 and the AH-1 are only two of the three components that define a JAAT today and that will defeat enemy targets on the battlefield.

CHAPTER III

JOINT AIR ATTACK TEAM TODAY

The JAAT concept initially evolved as a small "subset of CAS." Today, JAAT is potentially a large portion of the CAS mission due to JAAT's demonstrated ability to provide "firepower throughout the entire width and debth of the battlefield." (3:16) JAAT has earned a larger share of the CAS mission due to the potential that JAAT shows for employment by maneuver commanders in deep, close, and rear operations to complement the ground tactical plan. Also, improvements in weapons and technology and in doctrine developments such as Air-Land Battle Doctrine have enlarged the role of JAAT as a CAS mission. (3:16)

JAAT Multi-Service Joint Air Attack Team Operations is the document that defines and standardizes multi-service JAAT operational procedures is in final draft. The USAF, Navy, Marines, and Army have agreed in the JAAT document that their respective services will implement the JAAT procedures for training, doctrine , and conduct of multi-service JAAT operations. (1:iv) Prior to examining the future of the JAAT in the Air-Land battle, the current capabilities of the components that could comprise the Air-Land JAAT must be understood.

The minimum requirement for a JAAT today is tactical, fighter fixed-wing aircraft (USAF, US Navy, Marine Corps),

attack helicopters, and indirect fires from artillery or naval gunfire. (1:iii) The JAAT definition presented earlier mentioned that a JAAT is "normally supported by artillery or naval gunfire." (1:1-1) Therefore, without indirect fires employed on the same target array with fixed-wing fighters and attack helicopters, one does not have the complete JAAT.

The complete JAAT is a CAS mission that is executed either in a "direct support manner in support of the ground force(s) or in an independent manner away from the ground force(s)." (1:1-1) The indirect fire component of the JAAT is the limiting factor for a complete JAAT. Indirect fires will normally determine the maximum range and specific location that the complete JAAT can be employed away from ground forces. If the planned JAAT exceeds the range or capability of any of the three components to participate, the planned JAAT must be executed by a JAAT Task Force composed of those elements which can be employed. (3:18)

Today's USAF dedicates two aircraft to the CAS and JAAT missions: the A-10 Thunderbolt and the A-7 Corsair. Nearly one-third of the USAF tactical fighter wing arsenal is devoted to the CAS mission. (6:52) Currently, 10.3 wings (3.8 wings of A-7s and 6.5 wings of A-10s) of the entire Air Force 36.7 equivalent wings are dedicated to the CAS mission. (7:109) The high percentage (28 per cent) of aircraft provided by the USAF for support of the Army in

close operations shows the importance placed by the USAF on close air support to the Army. This fact also shows the importance placed by the Army on the need for firepower through air support. However, the USAF, with concurrence from the Army, plans "to phase the relatively slow A-10 attack aircraft out of high-intensity combat duties and replace it with an F-16 variant called the A-16." (8:47) The A-10 would move to become the future FAC aircraft until phased out of active service near the turn of the century. (8:47)

The A-7 in its current configuration is capable of being an effective multirole aircraft for both CAS and battlefield air interdiction (BAI). It "is well suited for the CAS/BAI mission in an Air-Land Battle environment because of its mature air-to-ground capability, range, survivability, and high pay-load capacity." (7:110) Additionally, it may be significantly cheaper to upgrade for CAS on the modern battlefield than either developing a new aircraft or upgrading another existing aircraft. (7:110) "The A-7 will be 'aged' out of the force unless upgraded...[and]...will remain capable of conducting close air support operations in less intense threat environments throughout the 1990s." (7:109) Upgrade of the A-7 to the A-7 Plus for future CAS is an option being examined by the USAF for use in active duty and Air National Guard forces. (7:110)

The USAF applies a 20-year rule of thumb to determine the life cycle of aircraft. The A-7 is scheduled to be decommissioned in 1994. The newest A-10s will achieve their 20 years of service life in 1998. (7:109) In addition to the operational reason for phasing out these aircraft, the threat on the modern battlefield will present some new challenges which make the A-10 and the A-7 uncompetitive. The challenges contributing to the A-10's and A-7's obsolescence include the threat of surface-to-air missiles, the slow speed of the A-10 (which increases its vulnerablity), the lack of night fighting capability, and the inability to "force-package" the slow A-10 with faster modern aircraft. (7:111) On August 22, 1986, The Deputy Secretary of Defense, William H. Taft IV, provided the Pentagon the guidance to program funds in the fiscal year 88-93 budget "for research, development, test and evaluation and procurement of follow-on CAS aircraft." Also, Mr. Taft's guidance included the requirement to evaluate simultaneously the ability to use a multirole aircraft for CAS to enhance the flexibility of the USAF's aircraft inventory. (7:109) Subsequent to the USAF's review of the A-16 and A-7 Plus options, the USAF will make the decision regarding which aircraft will inherit the CAS role for the Army.

Army aviation's primary contribution to the JAAT today is the AH-1 Cobra attack helicopter. The AH-1 was first used in Vietnam against motorized and personnel targets in 1968. The aircraft is a two-place helicopter that can be armed with various combinations of 7.62 mm miniguns that can fire 4,000 rounds per minute, a 40 mm grenade launcher, tube-launched optically-sighted wire-guided (TOW) missiles and 2.75 inch folding fin rockets. (9:47)

In 1987, the AH-1 Cobra began to be replaced in some Army units by the AH-64 Apache attack helicopter. The AH-64 will eventually replace most AH-1s in the active duty fleet. The Army has impressed the USAF with the AH-64's capability to destroy targets from the low to the high spectrum of conflict. (6:54) The aircraft can carry 16 Hellfire laser guided antiarmor weapons which will destroy any known armored vehicle. It is equipped also with a 30mm chain gun and can, like the AH-1, fire 2.75 inch rockets. The aircraft can designate targets with lasers for the A-10 or any USAF tactical aircraft. Its laser can also be used as a range finder for any of its own on-board weapons systems. AH-64 and A-10 joint operations have been so highly successful compared to the target killing capability of the AH-1 that these operations are often referred to as Advanced JAAT. For example, the A-10s can receive on their laser receiver the AH-64 laser target designations outside

of visual observation of the target, allowing the A-10 greater reaction and maneuver flexibility prior to attacking the target. (10:34) The advanced optics on the AH-64 provide increased day and night target acquisition capabilities; a 126 power optic provides daytime target designations on a television, while at night a 36 power magnification optic provides forward-looking infrared radar to acquire and attack targets. These highly sophisticated optics allow the AH-64 to engage targets outside of the range that friendly aircraft can be acquired by the enemy. (10:34)

The OH-58 Kiowa light observation helicopter is an integral Army member of the JAAT. The OH-58 will often be used by the Army aviation commander, who is the battle captain (the overall battle coordinator), as an aeroscout from which to orchestrate the JAAT. The scout in the OH-58 finds the target, directs the attack helicopters to their battle positions, coordinates artillery fires, and sequences the tactical fixed-wing aircraft into the target. The new OH-58D contains a mast-mounted sight with a laser designator. The laser designator and the aircraft radio systems are "compatible with the A-10's Pave Penny system and the laser guided Maverick missile" used by the USAF. (11:72)

The Marine Corps relies heavily on the AH-1T model Cobra to perform ship-to-shore escort missions and close-

operations protection of ground troops. (12:3) Due to the devastating fire power produced by the AH-1, the Marine Corps is convinced of "its superb versatility, weaponry, and responsiveness." Additionally, the Marines find that the AH-1's compact size is highly compatible with storage on Navy ships. (12:1)

Indirect fire support is an important component of the JAAT. In fact, most Army attack helicopter aviators do not consider the JAAT complete without the destructive powers of indirect fire support in the target area. JAAT is improved with the use of indirect fire support in at least three ways. First, the rate of advance is slowed as the enemy must close the hatches on motorized vehicles and, when exposed, retreat to armored vehicles when artillery is impacting. When the enemy is forced to react to artillery strikes, their capability to acquire and attack friendly ground or air assets is reduced. (13:4) Second, artillery can employ white phosphorus marking rounds to mark targets for jets and attack helicopters. Third, indirect fire can be used for suppression of enemy air defenses for fixed- and rotary-wing aircraft transiting to and from a JAAT as well as during the JAAT. (2:65)

The use of artillery during JAAT operations shows synchronization of fires at its best. Ideally, the synchronized JAAT attack includes indirect fires and fires from USAF tactical aircraft as well as Army attack

helicopters simultaneously on the same target array. In the past, the Army has not been able to employ effectively its artillery in a fully synchronized manner. Reasons for the past failure have included the inability of artillery to rapidly shift fires to hit new targets in a JAAT target area and to accurately engage targets directed by the JAAT battle captain. (14:7) The accuracy and reliability of indirect fires have been improved in JAAT operations through the AH-64's laser and avionics systems. The laser designator can determine ranges to a target from a known point, and when combined with the AH-64 Doppler navigation system and the direction reference indicator, eight digit map coordinates can be determined to coordinate adjustments of artillery. (10:35)

Artillery fires for JAAT operations are planned in battalion, brigade, and division tactical operations centers (TOCs) by the fire support officer (FSO) of the ground maneuver unit. "The air liaison officer, fire support officer, S-3, the army attack helicopter liaison officer, maneuver unit commander, all work together in the tactical operations center to ensure adequate supporting fires are planned for the JAAT." (1:4-2) The air liaison officer (ALO) and the fire support officer will respond to calls for fires from the Army battle captain in the aeroscout helicopter who is coordinating the JAAT. When artillery fires and tactical air fires are planned simultaneously on

simultaneously on the same target array, the aeroscout will devise an airspace deconfliction scheme at the target. Often, lateral separation is used to establish an informal boundary that defines the line to keep USAF and Army aviation separated from artillery gun-target lines and fires. The fire support officer in the tactical operations center may or may not be advised by the battle captain of partitioning in the objective area. (14:7)

Army and Marine ground units may employ the indirect fires of naval gunfire in a JAAT. Unlike most Marine Corps amphibious operations where the Marines are positioned within the range of naval gun fire, the Army is seldom postured to employ naval gunfire. Naval gunfire can be orchestrated by the Marine Air-Ground Task Force (MAGTF) commander or battle captain responsible for JAAT requirements to support his forces. (1:5-20) The Navy provides to Army divisions the Air and Naval Gunfire Liaison Company (ANGLICO) representative for planning and executing naval gunfire and Navy and Marine assets. (1:4-5) Navy gunfire will be coordinated by the Army battle captain if the Navy can reach the target with their ordnance. The Army aerial scout or JAAT battle captain can control naval gunfire by contacting his fire support officer, who has the responsibility to contact the nearest ANGLICO.

Indirect fires for JAAT operations bring with them some difficulties which must be corrected prior to

employment on the battlefield of the 1990s. Visual obscuration of fires will result on the dusty and smoke-filled battlefield. Fires from artillery and aerial platforms impacting in the same vicinity make it difficult to assess target destruction and to pinpoint a center of mass in order to shift fires. The ability of soldiers to accurately guide optically tracked weapons to point type targets through obscuration is severely diminished. (14.9)

JAAT today offers the maneuver commander a superb complement to the ground tactical plan. The synchronized employment of the JAAT will provide a highly lethal and unique tactical capability to kill a target array on the battlefield.

CHAPTER IV

JOINT AIR ATTACK TEAM AND TECHNOLOGICAL IMPROVEMENT

The ordnance systems in use today and those on the drawing board for tomorrow possess some considerable challenges for tactical integration procedures on the modernized battlefield of the 1990s. US weapons and tactics must evolve to meet the future threat with survivable standoff systems. All JAAT systems, artillery, fixed-wing tactical air, and attack helicopter weapons, are in the midst of important changes.

The artillery systems include the Copperhead, Cargo-carrying Projectiles, SADARM, Multiple Launch Rocket System (MLRS), and Joint Tactical Missile System (JTACMS)/Army Tactical Missile System (ATACMS). The Copperhead is a "cannon-launched guided projectile for 155 mm howitzers." The projectile seeker responds to laser energy reflected from the target and homes on that reflected energy. During flight, "midbody wings and tail-mounted cruciform control surfaces snap out" to provide means for the autopilot and on-board computer to guide the projectile to the laser-designated target. (15:62) The Copperhead can be programmed to remain under a 1,000-foot cloud ceiling. The two disadvantages of the Copperhead are that the target designator must be able to keep the laser on the target during the last phase of flight until impact and that the guidance system can be disrupted by obscurants. From 1985

through 1986, 11,000 Copperheads were procured by the Army and 1,800 by the Marine Corps. Procurement was significantly reduced in fiscal year 1987. (15:62)

Cargo-carrying projectiles, which have significant effectiveness improvements over conventional shells, are fired from either the 155 mm or 8-inch howitzer or the MLRS. If command, control, communications and intelligence systems are data linked to a forward observer with laser designation capability, the ability to locate and to shoot at a target is provided. Examples of cargo-carrying projectiles include ones that carry "nine remote anti-armor mine system devices that can stop any known tank." There is another projectile that "scatters 36 area-denial artillery munitions that bound upward when disturbed and release 600 fragments at 3,000 feet per second." A third cargo-carrier "dispenses 88 shaped-charged/fragmentation devices capable of penetrating light armor or inflicting personnel casualties." Because computers are used in the artillery firing process, data on targets can be stored if the need for additional artillery fire is anticipated. (15:57) These artillery projectiles can provide the JAAT with great personnel- and materiel-destroying power.

The SADARM weapon is a special type of cannon-launched cargo-carrying projectile that ejects multiple sub-munitions above the target area which are slowed by a

parachute that imparts a spin to the munition. The munition's look-down sensors activate after deployment and scan for an armor or artillery-type target. Once the target is acquired and is in range, the munition fires a self-forging "kinetic-energy penetrating warhead" with a velocity of about 8,000 feet per second, which is sufficient to defeat any currently fielded armor when the armored vehicle is struck from the top. The SADARM was successfully test-fired twice in April 1987, destroying an M-47 tank. (15:54)

The MLRS can reach targets at slightly over "30 kilometers with 644 M-77 anti-personnel/anti-material [sic] munitions." The MLRS can use "ripple fire" to discharge its 12 nine-inch diameter, 12-foot long rockets in under one minute. The rockets are pre-packaged in firing containers of six rounds; an arrangement that facilitates rapid reloading of the system. Under development for the MLRS is a "terminally guided warhead" (SADARM-type munition). (15:54)

The JTACMS and ATACMS will be fired also from the MLRS launcher. The JTACMS, or USAF version, will be a stealth-technology, long-range cruise missile. The ATACMS, or Army version, "will be a correctable-trajectory ballistic missile." (15:54) The ATACMS is planned to be approximately a 22-inch diameter weapon which will allow for improved submunitions and payload. The ATACMS package is designed to allow the use of the MLRS launcher. (15:54)

The USAF has fielded some new systems and is developing others to enhance the USAF's capabilities for JAAT in the 1990s. These systems include the Maverick, Air Guided Missile 130A/GBU-15, Low Altitude Navigation Targeting for Night Infrared Navigation (LANTIRN), Joint Surveillance and Target Attack Radar System (JSTARS), and Joint Tactical Information Distribution System (JTIDS). "The Maverick is a precision-guided tactical missile designed to attack individual hard targets at standoff ranges of up to 25 miles." (15:57) Two target seekers have been fielded for Maverick. The first one is the AGM-65A/B with a "nose-mounted television tracker on the missile and a TV receiver" in the aircraft cockpit. Tracker logic is used to guide the missile to the target. The other is the "Laser Maverick AGM-65E," which uses a laser designator with the ground unit to home it to the target. The system is currently being fielded by the USAF. (15:57)

The AGM-130 is "a powered version of Rockwell International's GBU-15 modular glide bomb." (15:52) The AGM-130 allows standoff bombing using 2,000 to 3,000 pound bombs or using submunition transporters. Submunitions include "anti-armor, sensor-fuzed munitions, HB876 area-denial mines and boosted kinetic-energy penetrator cratering submunitions." In flight, the AGM-130 is launched and guided to the target by the pilot using a weapon-mounted

television camera. The AGM-130 was scheduled for testing and evaluation in 1987 by the USAF. (15:52)

LANTIRN combines targeting sensors and navigation pods into a single forward looking infra-red radar (FLIR). LANTIRN turns darkness and bad weather into clear daytime conditions and has eliminated the need for reasonably clear weather previously required by air-to-ground tactical aircraft engaged in combat operations. "LANTIRN is the system that at last brings the TAF [Tactical Air Forces] out of the WW II era of ground attack." (11:73) A pilot using LANTIRN orients himself to the target using the navigation pod with its terrain-following radar and then switches on the target pod with its laser designator and precision stand-off weapons delivery system. The "heads-up" display shows the combined navigation and target information magnified nine times. (11:73) The LANTIRN system will provide the JAAT pilot an automated system that ensures a high degree of success in hitting targets on the modern battlefield in bad weather and at night.

The management center of the Air-Land battle can be executed by JSTARS. JSTARS will be positioned on the Boeing C-18 aircraft, a modified 707, and will provide real time radar image information to aircraft and ground stations on the movement of enemy vehicles to include the capability to determine the type of vehicle being tracked. (16:70) JSTARS will offer tactical aircraft enroute to an attack

mission the ability to receive immediate information on a moving target so that ordnance can be properly selected for the respective target and then fired. JSTARS information relayed to the cockpit can be superimposed over terrain data in the computer to determine if a vehicle being tracked is on a road or not. (17:55) JSTARS will provide the maneuver commander with specific real-time information that will clearly make a difference on the battlefield of the future.

JTIDS is the same system used now by the Airborne Early Warning and Control System (AWACS) to control huge numbers of fighters executing the air superiority mission. (16:70) JTIDS, like JSTARS, will instantaneously provide to air and ground stations information on target locations but must overcome two major hurdles before its fielding. (17:55) First, the data to be presented in the cockpit needs to be developed in a way that will not worsen the existing information overload. Secondly, the terminal display must employ some future technology to reduce both the size and cost of the display. Possible uses for JTIDS, once fielded, include determining ingress and egress corridors by pinpointing the enemy locations. (17:55) The adaptation of the JTIDS system from the air war to assist the ground war will increase the maneuver commander's capability to manage the ground battle.

The Army has two missiles for attack helicopters which will enhance Army aviation's performance on the

battlefield of the 1990s: the TOW antitank missile and the Hellfire AGM-114. The TOW has been used in the Army since 1970 and has a range of 3,750 meters. Since 1970, two enhancements have been made. First, the Improved TOW added a five-inch "extensible probe" to the warhead to improve the effect of the shaped charge. Second, the TOW 2 "upgraded guidance, increased warhead diameter to 6 inches, and provided a two-stage, solid propellant rocket motor." (15:64) The Soviet development of reactive armor for the T-72 and T-80 tanks contributed to the Army's upgrade of the TOW to retain its potent armor killing capability. (15:52) The primary disadvantage of the TOW is the requirement for the operator to remain in line of sight with the target to guide the missile. Because of this great vulnerability to the aircraft which causes the aircraft to remain unmasked and exposed the enemy, the Army is moving in the direction of the Hellfire, a fire-and-forget missile. (15:64)

The Hellfire, with its approximate 8000 meter range, is the tank destroyer that enhances Army aircraft survivability with its stand-off ability. The missile can be configured for either laser-homing or as an enemy infrared missile seeker. In the laser-homing role, an attack helicopter could launch a Hellfire from a masked location every few seconds. The aerial scout or the battle captain could laser-designate from one target to the next

for each missile fired. From 1985 through 1986, 11,000 Hellfires were purchased by the Army, and 1,750 were bought by the Marine Corps. (15:61)

The array of new munitions and battle management systems that are becoming available to the JAAT will increase the value of the JAAT to maneuver commanders. Many of these new weapons and systems enhance the survivability of the JAAT with the capability to provide stand-off firing platforms and stand-off observation of the enemy. Technological changes have simultaneously improved the JAAT and increased the challenge of integrating these changes into the next JAAT.

CHAPTER V

JOINT AIR ATTACK TEAM EMPLOYMENT CONSIDERATIONS ON THE BATTLEFIELD OF THE 1900s

The responsibility for conduct of a JAAT belongs to the maneuver commander. (18:4) A ground commander's scheme of maneuver and fire support plan are the building blocks of the ground tactical plan. The commander's ground tactical plan is the basis for JAAT planning which should take place within the context of the entire mission rather than planned in isolation of the overall maneuver unit mission. (19:36)

JAAT employment is determined by the enemy air and ground-threat environment, the type of friendly weapons systems assigned, and the overall mission of the maneuver commander. According to Major James A. Kelly, the following questions must be considered by a maneuver commander before planning a JAAT to complement his ground tactical plan on the modern battlefield:

- Are enemy armor and mechanized vehicles massed?
- Is the enemy moving or stationary?
- Has the enemy dispersed into tactical formations or is he in a road march?
- What are the assets available for the JAAT mission?
- Will US forces have air superiority during the JAAT?
- Can US forces execute offensive operations such as pursuits, counterattacks, and exploitations? (19:36)

The immense fire power and mobility provided by the JAAT will be a direct and immediate contribution to the ground tactical plan. In short, CAS and JAAT will be indispensable despite the risks to an effective defense against numerically superior forces. (20:6) A fighter pilot, who remains anonymous, properly framed the need for CAS. "You can shoot down all the MIGs you want; however, when you return to base, if the lead tank commander of an advancing enemy motorized division is eating lunch in your squadron snack bar, Jack, you just lost the war!" (21:22) Ground maneuver commanders are responsible for JAAT and will need to use the JAAT to help defeat a modern, motorized, formidable, and echeloned enemy.

The ground commander needs to halt enemy armor, infantry, artillery, and air power which is oriented on the friendly forces. JAAT's use may depend on the cost-effectiveness of air power assets and, therefore, high-priced weapons systems may not be best suited to the battle if there is high risk for loss of the system and if there is an alternative method to kill the enemy. Affordability, or costs-of-killing power, might be a factor in battlefield equations. (22:7)

The Threat

The Army and the USAF have analyzed the battlefield of the 1990s. The primary conclusions of these battlefield assessments are that the Soviet offensive strategy and

doctrine is oriented on fast-paced, continuous combat operations using multi-echelon forces which will be synchronized with offensive operations conducted in US rear areas to disrupt the ability of US forces to attack or defend. (7:108) The enemy will engage US forces throughout the spectrum of the battlefield, causing the US to fight deep, close, and rear operations simultaneously. The enemy's capability to fight these simultaneous operations will create a nonlinear battlefield. The forward edge of the battle area will be a fluid and particularly lethal environment as high technology weapons exact their toll on US CAS, and, therefore, JAAT efforts. (23:13) Several facts emerge from a study of the battlefield of the 1990s:

- Formidable air defenses of the enemy will prevent orbits and overflights of the target.

- Enemy air will attempt to interdict CAS and JAAT initiatives.

- Standoff weapons employment techniques will be employed by American fixed-wing aircraft in JAAT and CAS.

- American fixed- and rotary-wing aircraft will use low altitudes for ingress and egress to targets.

- The airborne FAC, if used, will be either collocated with the aerial scout or in a standoff mode away from the battlefield. (24:34)

The Army and the USAF threat capability assessment of the battlefield of the 1990s also revealed that CAS and JAAT remain vital and required missions for the maneuver commander for execution day or night no matter the weather. CAS and JAAT must be improved from today's capabilities, despite the hazards created by numerically superior forces employing highly lethal and modernized weapons. (11:2)

Considering the doctrine of echeloned array of the threat air defenses and the fact that the threat air defense "umbrella is designed to roll forward" with its "SAMs [surface-to-air missiles], antiaircraft guns, radars, and command, control, and communications" with the offensive forces, the US forces must modify their approach to conducting a JAAT and include the attributes of responsiveness, survivability, flexibility, target identification, and target destruction. (25:16)

Responsiveness

The primary problem now with JAAT and CAS is their responsiveness. (2:5) The President's Blue Ribbon (Packard) Commission on the topic of CAS highlighted lengthy response times for immediate missions as one of six CAS capability problems. The Packard Report also stated that "large fixed bases increase vulnerability, decrease flexibility, and reduce responsiveness and sortie rates." (24:34) The problem will not disappear as long as the USAF continues to use forward operating locations that are too

far from the forward edge of the battle area. (20:9) When the maneuver commander needs CAS, he needs it immediately. (20:7)

If one views the forward operating location concept in terms of responsiveness and survivability, the forward operating location concept has much merit. The concept is valuable if the CAS aircraft can arrive immediately, become oriented on the situation quickly, and generate a high number of sorties. The attack helicopter, due to its normal basing proximity to the forward edge of the battle area, is currently the only JAAT aircraft that can respond to immediate calls from the maneuver commander and achieve adequate responsiveness to the target area. (9:46) Positioned at a concealed and dispersed forward operating location near the maneuver brigade's rear boundary, the attack helicopter can be ready to fire on the enemy in approximately 10 minutes. (9:47)

Responsive JAATs will be synchronized with the maneuver commanders ground tactical plan through the air battle captain. The battle captain normally flies as an aerial scout in the OH-58 scout helicopter and is responsible for designating the targets or the sequence of targets to be attacked by artillery, attack helicopters, and tactical fixed-wing aircraft. The USAF TAC concurred with the Army that the battle captain will have the lead role in orchestrating the JAAT, that the FAC will control the

fighters, and that the FAC will dictate tactics for the fighters. (16:69)

USAF plans appear to include provision of immediate CAS approximately 30 minutes from the time of the request, which is too long a delay in the fast-paced battle of the 1990s. The tactical situation probably will have changed significantly in that 30-minute timeframe. (20:14) Several options exist for the USAF to improve future responsiveness. First, forward operating locations can be moved closer to forward edges of the battle area. However, the availability of long runways for CAS jets may not exist close enough to the maneuver unit. (20:9) Second, CAS aircraft can loiter airborne until called in for a CAS mission. Loitering enhances responsiveness but may fail to properly use aircraft or pilot resources effectively. Third, vertical/short takeoff and landing (V/STOL) aircraft, such as the US Marines' AV-8 Harrier, can be procured to provide the responsive fighter-attack capability to the ground commander. (20:9)

V/STOL aircraft, like the Harrier, are superb candidates to provide flexible CAS and offer increased survivability through field maneuverability. The Royal Air Force and the US Marines both obtain high sortie rates when operating from dispersed locations in a close forward operating location. (20:9) Tests that revealed interesting conclusions were conducted in Europe during North Atlantic

Treaty Organization (NATO) exercises on conventional jet aircraft versus V/STOL responsiveness in the CAS mission. Conventional aircraft took considerably longer to generate sorties, required long turnaround times, took longer to reorient on the target, and employed more ordnance than was required to do the mission than did V/STOL aircraft. (26:76) Air Commodore P. B. Hine, who was a former Harrier force commander in the Royal Air Force in Germany, stated, "In other areas such as mission effectiveness and the ability to survive, the RAF Germany Harrier force has been awarded the highest possible marks by the multi-national Tactical Evaluation Team of AAFCE." There will be no dearth of targets on the next battlefield. (20:8) Responsive aircraft providing the proper mix of target killing power will be an absolute necessity for CAS in the 1990s.

Survivability

Survivability was the foundation of JAAT. (1:5-1) This paper stated previously that the combination of attack helicopters and fixed-wing attack aircraft increased the survivability and effectiveness for both types of aircraft in major exercises and tests of the JAAT concept. Beyond the survivability that ensues from the synchronization of attack helicopter and fixed-wing aircraft, there are three survivability issues that will impact on required changes in

JAAT and CAS as America moves toward the battlefield of the 1990s: speed, altitude, and threat electronic warfare. (20:16)

Speed of tactical fixed-wing aircraft for the future battlefield is the subject of much debate. Criticism surrounds the USAF's intended replacement for the A-10 Thunderbolt, today's primary CAS and JAAT aircraft. The USAF Tactical Air Command (TAC) commander recommended that the production-line F-16s be modified into the A-16 variant with delivery initiating in 1992. The USAF is making a persuasive case to eliminate "competition for the sake of competition." If the USAF moves to the A-16 variant, many of the costs of development, testing, and investments by the contractor will be eliminated. (7:112)

A memorandum of agreement was signed by the USAF and the Army in 1985 that jointly framed the services' "need to field a follow-on CAS aircraft." (7:109) The action was based on the known age of the A-10 fleet, on the nature of the 1990s threat, and on the need to initiate momentum for further development (to provide a smooth transition from the slow A-10 to a new and faster aircraft). The two services also agreed that the new aircraft should orient on airframes currently in service or to be available in 1990. (7:109) The requirements for the new aircraft were established to include "an airframe and support systems tailored to penetrate and operate within enemy territory under adverse

weather day/night conditions." Additionally, the aircraft "must have an armor-killing capability--possibly by means of a gun--and be optimized for the air-interdiction mission." (7:111) Changes necessary to existing F-16s to form the A-16 variant and meet the requirement include a forward infrared radar navigation pod such as LANTIRN, "laser spot seeker, digital terrain system, and a jam-resistant Army data link." (7:113) The Army and USAF have demonstrated superb cooperation in their development of a new and potentially survivable CAS and JAAT aircraft.

The development of fast aircraft for the CAS role has been criticized. Critics argue that the characteristics of the A-10 that made it so ideal for CAS should persist in the new aircraft. For example, the critics point out the following facts:

- The slow speed of the A-10 has allowed it to view both the friendly's and enemy's lines so that it could properly hit the target. (6:53)

- The superb loiter capability of the A-10 has enhanced its responsiveness. (6:53)

- The small arms penetration protection built into the A-10 makes it ideally suited for survivability. (6:53)

TAC's counterview is that the modern battlefield's lethality will not permit loitering or slow aircraft and that the F-16's demonstrated air-to-ground munitions accuracy shows that fast aircraft can effectively perform

the CAS mission. (6:53) Speed, according to the TAC commander, General Robert D. Russ, will be a necessity on the battlefield of the 1990s. He believes that, when ingressing and egressing CAS targets, tactical aircraft will need to overfly SAM sites and a large number of accurate and lethal anti-aircraft weapons. In this environment, the A-10 cannot compete because it is too slow. (6:52) Speed could be an ally on the next battlefield since survivability through speed on CAS and JAAT missions may mean not being hit by enemy air defenses.

High versus low flight altitudes for CAS and JAAT in the next war may require some review of established doctrine. Several arguments to determine if a high or low altitude is best are ongoing. Current USAF doctrine calls for aircraft penetration at low altitudes and a pop-up for attacking areas that are well-defended. The tactic of successfully popping-up at fast air speeds is questionable. Will the pop-up occur at the proper location? Will the pop-up be off-line or on-line to the target? Will the pilot properly identify the target during a quick pop-up? (27:21) Perhaps, the following Israeli experience demonstrates a valuable lesson about the effectiveness of low-level flight into a pop-up.

The Israelis abandoned the pop-up technique as an unsatisfactory tactic. They found that low-flying, high-speed aircraft were being shot down by ground soldiers and

ground-to-air anti-aircraft fire. Consequently, they found in the 1973 war that the use of a medium altitude was most effective in attacking SAM sites and in controlling the air space. Additionally, the tactic of medium altitude again recently worked well for the Israelis in the Bekaa Valley. In Vietnam, the USAF incurred heavy losses to surface-based defenses and found that target-locating ability was diminished while using low altitude tactics. (27:21) Medium-altitude advocates state that above 1,500 feet the aircraft is out of danger from small arms fire. (28:48) They also point out that higher altitudes place the aircraft where SAMs can see but will not affect the aircraft because of the on-board systems that warn the pilot and provide reaction time against a SAM launch. (27:22) Regardless of whether the tactic is to fly low or high, the threat air defenses require as much standoff delivery for munitions as possible to provide survivability.

Effective JAATs must be more than survivable in view of the lethal array of enemy defenses on the battlefield of the 1990s. The effective JAAT must succeed despite a vast lineup of electronic warfare (EW) doctrinally employed by the Warsaw Pact. The air-to-ground, ground-to-air, and EW threat are three formidable aspects of enemy offensive doctrine that will contest the conduct of JAATs. (11:59)

Specifying the range of projection of enemy EW across the forward edge of the battle area and the impact of enemy

EW on various types of electronic emissions is difficult. However, massive jamming of communication between JAAT participants will certainly be conducted. FAC-to-fighter radio briefings, scout-to-attack helicopter communications, and artillery radio instructions and briefings may need to be abbreviated to have a chance for successful transmission. However, the fact that the short-format and authentication procedures may be unworkable during heavy jamming was a finding at the Quick Thrust Exercise in November, 1982. (29:7)

JAAT is difficult (perhaps impossible) when executed in the absence of communications. Some minimal level of communications will be required to guide attack aircraft to their respective targets. (11:60) Israeli pilots in the 1973 Yom Kippur War revealed that much of their ground-to-air UHF and VHF radio frequencies were jammed within one minute of coordination with the FAC. (20:11) Most JAAT missions will take place within the range of enemy EW capability and will require that the effectiveness of future electronic communications during JAAT in an EW environment must be considered.

EW is a combat multiplier used by the enemy that US systems must be able to overcome to fight JAAT on the next battlefield. The current technique to reduce the effects of enemy jamming during JAAT is the use of frequency-hopping radios, which the USAF, unlike the Army, already use in JAAT

aircraft. (30:4) JAAT aircraft of the future will employ a combination of frequency hopping radios with accurate aircraft-positioning systems, such as the Global Positioning System, an aircraft positioning system that all services will use to help reduce communications for JAAT targets. The Global Positioning System provides aircraft positions within 16 meters and, when combined with jam-resistant radios for defeating enemy EW and JSTARS for management of the battle, the synergistic effect of these three components can improve the survivability and effectiveness of JAAt on the next battlefield. (30:3)

Flexibility

Flexibility requires the capability of JAAT aircraft to conduct JAAT operations in severe weather conditions and during the day or night on today's fluid and modernized battlefield. Weather, primarily as visibility, not the cloud base, is the limiting factor for both rotary-and fixed-wing aircraft. Attack helicopters have been known to effectively perform daytime CAS with only a 100-foot ceiling and 1,500 meters of visibility. On the other hand, fixed-wing aircraft, specifically the A-10s, need at least a 500-foot ceiling and 2 1/2 kilometers of visibility to execute an effective daytime attack. The night weather and ceiling requirements are higher for each aircraft. Poor weather conditions would be exacerbated by the smoke, dust, and haze created by munitions and explosions in the target area.

Therefore, aircraft faster than the A-10 would require higher minimum weather conditions due to the faster airspeed. (20:13)

The flexibility of JAAT can be measured in its ability to be used in all weather conditions and in day or night. Daytime JAAT is normally executed visually against point or area targets. Daytime attack may be executed through the clouds without observation of some, but not all, target areas. However, orchestration of daytime attacks through the clouds is difficult without the availability of accurate beacon or radar-bombing equipment. (21:24) Nighttime JAAT, currently the weakest area of JAAT operations, is rarely included in night training programs. When night training does take place, it is executed on well-lighted ranges. (11:88) On the battlefield of the 1990s, most JAAT aircraft will be equipped with LANTIRN, which will improve target acquisition in conditions of bad weather and at night. (21:24)

Flexibility also requires an examination of JAAT components to determine if the mix of JAAT aircraft should change for the 1990s battlefield. JAAT in the next war must closely coordinate targets with the ground unit to survive the formidable and highly lethal battlefield, to kill tanks, and to generate high sortie rates. The USAF will retire the A-10. The A-16 is the planned replacement. The Army is

replacing the AH-1 with the AH-64. Data from numerous JAAT and CAS studies have recently shown that an AH-64 is better than an A-10 at killing tanks in a JAAT primarily because the AH-64 can generate more sorties in a given 12 hour period. (4:74) Perhaps, the Army should assume the JAAT and CAS missions by expanding its AH-64 fleet. The Air Force would acquire the advantages of the increased force structure for flight missions by giving up the Tactical Air Control Party requirement and the ability to concentrate their efforts and resources on higher payoff missions. (4:74)

Target Identification

The most important and difficult aspect of JAAT is timely and accurate target identification. Colonel Hans Rudel of the German Luftwaffe, who tallied 519 kills of Soviet tanks in World War II, stated that "the problem was not actually shooting or killing the tank, but it was finding the tank." (31:5) Colonel Rudel's comment on target identification will be equally true on the battlefield of the 1990s as it was in World War II. The factors of target marking and target-identification systems are key elements of target identification on the next battlefield.

Target marking for attack helicopters, and particularly for fixed-wing aircraft, is a difficult job on the high-intensity battlefield. Common reference points, such as the

commonly used colored smoke grenade, can be recognized by helicopter pilots, by attack pilots, and by FACs. Other techniques, such as flares or ground panels, are available to pinpoint friendly positions. Target locations can also be marked using "artillery smoke marks, tracers, or laser designators." (21:25) CAS pilots usually need an observer, either on the ground or in the air, to describe and designate targets since targets are difficult to see at the high rates of speed that fighters maintain. Usually, FACs pass the target information from ground observers or aerial scouts to tactical fighters. Hand-offs of accurate target information are difficult procedures that complicate the entire process of weapons delivery for fixed-wing aircraft since the target information is being passed several times before being received by the pilot. Even if accurate information reaches the pilot, the problem of finding the target on the ground still exists. (27:21) JAAT needs "smart" systems instead of people to execute the target-identification process.

Target-identification systems that can be installed in an aircraft to see a target without the requirement to use a FAC for target hand-off will be necessities for the jet aircraft on the battlefield of the 1990s. Systems that allow weapons delivery in all weather conditions during day or night and from stand-off ranges are needed to solve the problem of identifying targets. The high rate of offensive

movement doctrinally used by Soviet armies will require aircraft to make quick, point-target selection decisions. (31:6) JSTARS and LANTIRN may be two of our stand-off sensor systems which can, in all weather and cloud conditions, find and attack the enemy and preserve a role for fixed-wing fighters in JAAT and CAS. (31:7)

The FAC is the planned method to execute target identification for tactical fixed-wing fighters. The FAC must be able to "see" the battle in order to control and orchestrate fires required by the JAAT battle captain, to report outcomes, to hand-off the battle, and to fix enemy firing locations. (24:35) Some argue that the lethal battlefield and enemy momentum may eliminate the effectiveness and need for the FAC, while others contend that technological improvements such as laser designation are increasing the FAC's role. (32:60) The USAF takes a middle ground in its White Paper assessment of FAC capabilities in a 1995 threat environment: "The FAC team is effective and vital today. The tasks performed by the FAC will still need to be accomplished in 1995." (33:ii) Despite the USAF claim, the aerial FAC facing the Soviet air defense threat even today will not be able to get close enough to the JAAT targets to "see" the battle. Additionally, the enemy's EW capability will not allow the FAC to convey electronically what he has seen.

Target Destruction

Target destruction is the real measure of the effectiveness of JAAT on the battlefield. When performed and orchestrated properly by the battle captain, the JAAT is the epitome of synchronization in war. The JAAT orients on high-priority targets that support the maneuver commander's ground tactical plan. The synergistic effect of artillery, attack helicopters, and tactical fixed-wing aircraft attacking a single target array is formidable. (18:A-2-1) Important to any JAAT attack is synchronization of JAAT team members and the effective use of stand-off munitions.

Additionally, the battle captain will coordinate suppression of enemy air defenses to cover movements of JAAT aircraft enroute to, during the JAAT, and egressing from the targets. Through the ANGLICO liaison officer in the maneuver brigade's tactical operations center, the battle captain may request naval gunfire (with a maximum range of up to 36,000 meters) to further integrate his fires. (1:E-3) The synchronization of all JAAT assets, either offensively or defensively, is a difficult job that requires effective command, control, and communications.

The success of the JAAT depends on communications. Synchronizing the fires of the JAAT requires the battle captain to conduct a complex coordination effort which requires all JAAT participants to be in communication with the battle captain or element which is passing their

respective instructions. Neither the current state of communications technology in JAAT aircraft nor the status of Army and USAF JAAT training allows a successful JAAT without communications. The 1990s EW threat will not allow the electronic transmissions of JAAT operations conducted near the forward edge of the battle area to be properly received despite friendly anti-jam and counter-jam techniques. Devices such as the Automatic Target Handoff System, which sends a scrambled set of target coordinates data from a battle captain or a FAC to an inbound tactical jet, will not clearly transmit target data over massive threat EW efforts. The future of a synchronized JAAT is not bright without communications systems that can overcome the enemy's disruptive EW campaign. (23:17)

Target destruction can be enhanced on future battlefields through the use of standoff weapons. In fact, if weapons systems employed by attack aircraft in the future are not standoff weapons, US aircraft will suffer high attrition due to enemy air defense weapons. Fixed-wing attack aircraft are in jeopardy with today's threat. Only technological improvements that avoid target overflights, eliminate multiple passes at the same point target, and employ the right weapon to kill each target can preserve a limited role for fixed-wing aircraft. (22:158) Systems such as LANTIRN and JSTARS can help provide fixed-wing pilots the stand off capability to kill a target by seeing

it at long distances, selecting the proper ordnance, and launching fire-and-forget type weapons to acquire and kill. Without the implementation of these systems, the future of fixed-wing aircraft in JAAT is gloomy.

CHAPTER VI

CONCLUSIONS AND FINDINGS

This study concludes that JAAT procedures on the battlefield of the 1990s must be changed significantly to accomplish the JAAT mission. The synchronized JAAT does not just happen; it is derived by a maneuver commander who recognizes the combat multiplier of a JAAT in supporting his ground tactical plan. The synergy of tactical/fixed-wing fighters, attack helicopters, and artillery or naval gunfire provides a combined arms team that is a lethal complement to the maneuver commander's plan.

In examining the current procedures for JAAT and their applicability to the 1990's battlefield, six findings were illuminated:

- Command, control, and communications of the JAAT in close and deep operations will be seriously degraded by enemy's electronic warfare procedures.

- The role of the airborne FAC in JAAT will be reduced due to an inability to get the FAC close enough to "see" the battle effectively and due to the inability of the FAC to communicate with his fighters through enemy electronic warfare procedures.

- Replacement of the A-10 with a faster aircraft by the USAF for the JAAT may degrade the capability to place first-pass hits on the designated JAAT target unless accurate

stand-off weapons and weapons technology can provide the fast aircraft the ability to "see" the battlefield.

- Low altitude ingress by tactical fixed-wing aircraft: degrades communication from the FAC and the battle captain to the fighter, does not allow evasive reactions from enemy ground-to-air projectiles, and creates the dangerous "pop-up" requirement to acquire the target and release ordnance quickly.

- JAAT and CAS missions should become an Army mission, when the Army fully fields the AH-64, due to the high sortie generation and rapid responsiveness of the Apache.

- The USAF should examine the use of forward operating locations and the use of V/STOL aircraft to enhance the fixed-wing fighter responsiveness to the JAAT and to the maneuver commander's tactical plans.

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GLOSSARY

ANGLICO	Air and Naval Gunfire Liaison Company
ATACMS	Army Tactical Missile System
CAS	Close Air Support
EW	Electronic Warfare
FAC	Forward Air Controller
JAAT	Joint Air Attack Team
JSTARS	Joint Surveillance and Target Attack Radar System
JTACMS	Joint Tactical Missile System
JTIDS	Joint Tactical Information Distribution System
LANTIRN	Low Altitude Navigation Targeting Infrared for Night
MLRS	Multiple Launch Rocket System
SAM	Surface-to-air Missile
TAC	Tactical Air Command
TOW	Tube-launched, Optically-sighted, Wire-guided Missile
USAF	United States Air Force
V/STOL	Vertical/Short Take-off and Landing Aircraft